

**FY2006**

**RIVERBANK ARMY  
AMMUNITION PLANT**

**CALIFORNIA**

**INSTALLATION ACTION PLAN**

Printed July 2005

---

## Statement of Purpose

The purpose of the Installation Action Plan (IAP) is to outline the total multi-year Installation Cleanup Program for an installation. The plan will identify environmental cleanup requirements at each site or area of concern, and propose a comprehensive, installation-wide approach, with associated costs and schedules, to conduct investigations and necessary remedial actions.

In an effort to coordinate planning information between the restoration manager, U.S. Army Environmental Center (USAEC), Riverbank Army Ammunition Plant, executing agencies, regulatory agencies, and the public, an IAP was completed. The IAP is used to track requirements, schedules and tentative budgets for all major Army installation cleanup programs.

All site-specific funding and schedule information has been prepared according to projected overall Army funding levels and is, therefore, subject to change. All remedies are in place at RBAAP, LTM and RA(O) will continue.

**The following agencies contributed to the update of this IAP:**

Engineering and Environment, Inc. for AEC

US Army Environmental Center

---

# Table of Contents

<i>Statement of Purpose</i> .....	1
<i>Table of Contents</i> .....	2
<i>Acronyms &amp; Abbreviations</i> .....	4
 <b>INSTALLATION INFORMATION &amp; DESCRIPTION</b>	
<i>Installation Information</i> .....	7
<i>Cleanup Program Summary</i> .....	9
 <b>SUMMARY</b>	
<i>Installation Action Plan Summary</i> .....	11
 <b>CONTAMINATION ASSESSMENT</b>	
<i>Contamination Assessment</i> .....	12
<i>Previous Studies</i> .....	16
 <b>SITE DESCRIPTIONS</b>	
<i>RBAAP-01 - Landfill, RBAAP</i> .....	19
<i>RBAAP-02 - Waste Salt Disposal Pit</i> .....	20
<i>RBAAP-03 - Ground Water Trmt Plnt (GWTP)</i> .....	21
<i>RBAAP-04- IWTP Effluent Sewer Line Break</i> .....	22
<i>RBAAP-05 - Bldg. 13 Chromium Trmt</i> .....	22
<i>RBAAP-06 - IWTP H2SO4 Spill</i> .....	23
<i>RBAAP-07 - Bldg. 13 Phos Spill</i> .....	23
<i>RBAAP-08 - SE Storm Reservoir</i> .....	24
<i>RBAAP-09 - NW Storm Reservoir</i> .....	24
<i>RBAAP-10 - Sewage Trmt Plnt/Sludge Beds</i> .....	25
<i>RBAAP-11 - Perc/Evap Ponds (Stantislau)</i> .....	25
 <b>SCHEDULE</b>	
<i>Past Milestones</i> .....	26
<i>Schedule Chart</i> .....	26-1
 <b>COST ESTIMATES</b>	
<i>Prior Year Funds</i> .....	27
 <b>COMMUNITY INVOLVEMENT</b>	
<i>Restoration Advisory Board Status</i> .....	31

**MILITARY MUNITIONS RANGE PROGRAM**

MMRP Summary .....33

MMRP Contamination Assessment .....34

**SITE DESCRIPTIONS**

RBAAP-001-R-01 Pistol Range.....36

**SCHEDULE**

Past/Projected Milestones .....37

Schedule Chart .....37-1

**COST**

Prior/Current Year Funding .....38

## Acronyms & Abbreviations

<b>ACSIM</b>	Assistant Chief of Staff for Installation Management
<b>AEDB-R</b>	Army Environmental Database - Restoration
<b>BRAC</b>	Base Realignment and Closure
<b>CTC</b>	Cost-to-Complete
<b>cy</b>	cubic yards
<b>DERA</b>	Defense Environmental Restoration Account
<b>DSERTS</b>	Defense Site Environmental Restoration Tracking System
<b>DLM</b>	Designated Level Methodology
<b>DoD</b>	Department of Defense
<b>DRMO</b>	Defense Reutilization and Marketing Office
<b>DRO</b>	Diesel Range Organics
<b>DTSC</b>	Department of Toxic Substances Control
<b>EE/CA</b>	Engineer Evaluation/Cost Analysis
<b>E/P</b>	Evaporation/Percolation
<b>EPA</b>	(United States) Environmental Protection Agency
<b>ER,A</b>	Environmental Restoration, Army (formerly called DERA)
<b>FFSRA</b>	Federal Facility Site Remediation Agreement
<b>FS</b>	Feasibility Study
<b>FFPR</b>	Firm Fixed Price Remediation
<b>ft</b>	foot
<b>FUDS</b>	Formerly Used Defense Sites
<b>FY</b>	Fiscal Year
<b>GOCO</b>	Government Owned, Contractor Operated
<b>GRO</b>	Gasoline Range Organics
<b>GW</b>	Groundwater
<b>GWTS</b>	Groundwater Treatment System
<b>HRS</b>	Hazard Ranking Score
<b>IA</b>	Installation Assessment
<b>IAG</b>	Interagency Agreement
<b>IAP</b>	Installation Action Plan
<b>IGWTS</b>	Interim Groundwater Treatment System
<b>IOC</b>	Industrial Operations Command
<b>IRA</b>	Interim Remedial Action
<b>IRM</b>	Interim Remedial Measures
<b>IRP</b>	Installation Restoration Program
<b>IWTP</b>	Industrial Waste Treatment Plant
<b>K</b>	1,000
<b>kg</b>	kilograms
<b>L</b>	Liter
<b>lb</b>	pound
<b>LRE</b>	Limited Risk Evaluation
<b>LTM</b>	Long-term Management
<b>MACOM</b>	Major Army Command
<b>MCL</b>	Maximum Contaminant Level
<b>mg</b>	milligrams
<b>MMRP</b>	Military Munitions Response Program
<b>MSC</b>	Major Subordinate Command
<b>MW</b>	monitoring well
<b>ND</b>	Non-Detect

## Acronyms & Abbreviations

<b>NE</b>	Not Evaluated
<b>NI</b>	Norris Industries
<b>NFA</b>	No Further Action
<b>NPL</b>	National Priorities List
<b>OSC</b>	Operations Support Command
<b>OU</b>	Operable Unit
<b>PA</b>	Preliminary Assessment
<b>PBC</b>	Performance-Based Contract
<b>PAH</b>	polynuclear aromatic hydrocarbons
<b>PCB</b>	polychlorinated biphenyl
<b>PiC</b>	picoCuries
<b>PID</b>	Photoionization detector
<b>POL</b>	Petroleum, Oil & Lubricants
<b>PCB</b>	polychlorinated biphenals
<b>PRG</b>	Preliminary Remediation Goals
<b>PWS</b>	Performance Work Statement
<b>RA</b>	Remedial Action
<b>RA(C)</b>	Remedial Action - Construction
<b>RA(O)</b>	Remedial Action - Operation
<b>RAB</b>	Restoration Advisory Board
<b>RC</b>	Response Complete
<b>RCRA</b>	Resource Conservation and Recovery Act
<b>RD</b>	Remedial Design
<b>REM</b>	Removal
<b>RI</b>	Remedial Investigation
<b>RIP</b>	Remedy in Place
<b>ROD</b>	Record of Decision
<b>RPM</b>	Remedial Project Manager
<b>RRO</b>	Residual Range Organics
<b>RRSE</b>	Relative Risk Site Evaluation
<b>RWQCB</b>	Regional Water Quality
<b>SI</b>	Site Inspection
<b>SVE</b>	Soil Vapor Extraction
<b>SVOC</b>	Semi-Volatile Organic Compounds
<b>SWMU</b>	Solid Waste Management Unit
<b>TCE</b>	trichloroethene
<b>TCDD</b>	tetrachloro-dibenzo dioxin
<b>TCLP</b>	Toxicity Characteristic Leaching Procedure
<b>TEQ</b>	Toxic Equivalents
<b>TOC</b>	Total Organic Hydrocarbons
<b>TP</b>	Test Pit
<b>TPH</b>	Total Petroleum Hydrocarbon
<b>TRC</b>	Technical Review Committee
<b>µg/l</b>	microgram per liter
<b>USACE</b>	United States Army Corps of Engineers
<b>USACHPPM</b>	United States Army Center for Health Promotion and Preventive Medicine
<b>USAEC</b>	United States Army Environmental Center (formerly called USATHMA)
<b>USAEHA</b>	United States Army Environmental Hygiene Agency (replaced by USACHPPM)
<b>USAF</b>	United States Air Force
<b>USATHAMA</b>	United States Army Toxic Y Hazardous Material Agency (replaced by USAEC)

---

## Acronyms & Abbreviations

<b>UST</b>	Underground Storage Tank
<b>UXO</b>	Unexploded Ordnance
<b>VOC</b>	Volatile Organic Compounds
<b>WTP</b>	Water Treatment Plant
<b>Yr</b>	Year

**INSTALLATION LOCALE:** Riverbank Army Ammunition Plant is located in the center of California's San Joaquin-Sacramento Valley near the city of Riverbank, in Stanislaus County, California. Riverbank has a population of 16,400; the nearest large community is Modesto located 10 miles southwest of the installation and having a population of 210,000.

The main plant comprises 145 acres and four industrial waste treatment evaporation/percolation (E/P) ponds cover an additional 28 acres. RBAAP is bordered on the east by pastureland and on the north, west and south by sparse residential areas.

**INSTALLATION MISSION:**

Military Laidaway Industrial Facility. Recently listed on the BRAC 2005.

**LEAD ORGANIZATION:**

Joint Munitions Command

**REGULATOR PARTICIPATION:**

**Federal:** U.S. Environmental Protection Agency (EPA), Region IX

**State:** California Environmental Protection Agency, Department of Toxic Substances Control (DTSC)

- California Environmental Protection Agency, Regional Water Quality Control Board, Central Valley Region (RWQCB)

**NPL STATUS:**

- National Priorities List (NPL) Installation, February 1990
- Technical Review Committee (TRC) Equivalent, October 1985
- Interagency Agreement, June 1990
- Final Record of Decision (ROD), March 1994
- Construction Completion, September 1997

**RAB/TRC/TAPP STATUS:** A strong relationship between RBAAP and the community began in 1985 with the establishment of the TRC, the precursor to today's RABs. In 1943, DoD established RABs to increase public participation. RBAAP solicited community interest in forming a RAB, but since the cleanup process was already well underway, the ROD was already signed, and the community had been well informed throughout the process, little interest was expressed in establishing a RAB. Since the community was not in favor of establishing a formal RAB, RBAAP requested exemption to the DoD RAB policy to keep the TRC intact.

**PROGRAM SUMMARIES:**

**IRP**

Contaminants of Concern: Hexavalent Chromium, Cyanide, Zinc

Media of Concern: Soil, Groundwater

Estimated date for RIP: 1997

Funding to Date: (FY -FY05): \$50,749,787

CTC: \$ 3,145,000



### **MMRP**

Contaminants of Concern: UXO

Media of Concern: Soil

Estimated date for RIP/RC: No DoD priority action is necessary.

Funding to Date: \$25,000

CTC: \$1,243,000

---

## Cleanup Program Summary

### ***HISTORIC ACTIVITY:***

Riverbank Army Ammunition Plant is an active Government-owned, contractor-operated (GOCO) industrial installation under the jurisdiction of the U.S. Army Joint Munitions Command. RBAAP was constructed in 1942 by the Aluminum Company of America (ALCOA) as an aluminum reduction plant supplying military requirements. The plant was built under the authority of the Defense Plant Corporation. RBAAP started production on May 18, 1943. The plant was designed to produce 40,000 tons of aluminum per year. The plant was closed by order of the War Production Board on August 7, 1944 due to the reduced need for aluminum by the military in World War II.

After closure of the plant in 1944, the facilities were used for the storage of a variety of government surplus materials, including corn and grain. In 1951, the Army gained control of the plant to manufacture steel cartridge cases for joint use by the Army and Navy. The Norris Thermador Corporation (now NI Industries (NI)) was awarded the contract for conversion and operation of the plant. Since 1951, the plant has remained a Government-owned, contractor-operated, industrial metal working plant. Manufactured materials, such as cartridge cases, grenades and projectiles are shipped to other ammunition plants for loading operations. Levels of production have fluctuated significantly, with peak periods corresponding to the Korean and Vietnam Conflicts.

RBAAP was proposed for inclusion on the National Priorities List (NPL) with a Hazard Ranking System (HRS) score of 63.94 and was officially placed on the NPL on February 16, 1990. Subsequently, an Interagency Agreement was signed by the Army, EPA Region IX, California Department of Health Services (now California EPA - Department of Toxic Substances Control) and California Regional Water Quality Control Board, which became effective in June 1990.

---

# Cleanup Program Summary

## ***PROGRAM PROGRESS:***

### **IRP:**

A Firm Fixed Priced Remediation (FFPR) approach under a Performance-Based Contract (PBC) was awarded on 29 April 2004. Under the terms of the contract, the following are the performance objectives:

- Assume operations of RBAAP-03 Groundwater Treatment System on March 15, 2004. Develop and implement a revised Operations and Maintenance (O & M) Plan for RBAAP-03: Groundwater Treatment System by Jun 1, 2004.
- Develop and implement a ramp-down/exit strategy for RBAAP-03: Groundwater Treatment System by March 1, 2005.
- Conduct long-term monitoring (LTM) for the duration of the contract at: RBAAP-01 Landfill; RBAAP-03 Groundwater Treatment System, RBAAP-11 Evaporation/Percolation Ponds.
- Develop and implement a ramp-down strategy for the LTM efforts by Sept 1, 2005 at: RBAAP-01 Landfill; RBAAP-03 Groundwater Treatment System, RBAAP-11 Evaporation/Percolation Ponds.
- Complete all CERCLA 121 (c) five-year reviews required for the sites identified in this PWS throughout the duration of the contract, correction of any deficiencies noted, and consolidation of reviews into a single site-wide review conducted at the conclusion of the contract.
- Develop a strategy to de-list RBAAP from the National Priorities List (NPL) and include approved delisting plan in the 2005 CERCLA 121(c) five-year review. Complete NPL delisting by Sept 1, 2007.

To date, the contractor has assumed the operation and maintenance of the Groundwater Treatment System, and began long-term monitoring of RBAAB-01, RBAAP-03, and RBAAP-11. In addition, a draft ramp-down/exit strategy for RBAAP-03, a draft 5-year review, and draft NPL de-list strategy was submitted on 29 April 2005. The Army is currently reviewing and providing written comments to each document.

An in-situ action to reduce hexavalent chromium to trivalent chromium is currently in progress. Phase I of the in-situ effort was completed in February 2005. Phase II will be complete in the summer of 2005.

### **MMRP:**

A “Final CTT Inventory Report, Riverbank AAP, March 2003” was completed. Based on the results of that report, the risk assessment code (RAC) was 5. RAC 5 is defined as negligible explosives safety risk – no explosive related action necessary. A Site Inspection is planned in FY08.

**STATUS:** NPL Installation with a HRS Score of 63.94

**AEDB-R SITES/SITES RC:** 12 AEDBR sites

3 Active ER,A Eligible AEDB-R Sites

9 Response Complete AEDB-R Sites

**AEDB-R SITE TYPES:**

2 Contaminated Buildings      1 Landfill

3 Waste Treatment Plants      2 Spill Site Areas

4 Surface Impoundment/Lagoons

**CONTAMINANTS OF CONCERN:** Metals, POL

**MEDIA OF CONCERN:** Groundwater, Soil,

**TOTAL ER,A FUNDING:**

PRIOR YEAR:                      \$ 50,749,787

FUTURE REQUIREMENTS:      \$ 3,145,000

TOTAL:                              \$ 53,894,787

**DURATION OF IRP:**

YEAR OF IRP INCEPTION:                      1980

YEAR OF IRP COMPLETION EXCLUDING LTM/RA(O):      1998

YEAR OF IRP COMPLETION INCLUDING LTM/RA(O):      2015+

---

## IRP Contamination Assessment

In 1979, an Installation Assessment conducted by the Army concluded that areas of the Riverbank Army Ammunition Plant (RBAAP) and the waste disposal ponds located off-site were potentially contaminated with heavy metals and other chemicals as a result of procedures used in past manufacturing operations and waste disposal practices. The assessment also indicated the potential for migration of the contaminants into the subsurface soils and waters.

In April 1984, USATHAMA contracted Envirodyne Engineers, Inc. (EEI) to undertake a two-phase field program to investigate the contamination at the RBAAP. The Exploratory Phase, which was completed in July 1985, indicated groundwater contamination primarily by chromium and cyanide. The Confirmatory Phase, which was completed in October 1986, confirmed levels of contamination in the groundwater at the RBAAP and concluded that the primary sources were the on-site landfill and the Industrial Waste Treatment Plant (IWTP) area.

In December 1986, following the Confirmatory Phase activities, USATHAMA contracted WESTON to conduct an additional round of groundwater sampling. WESTON field personnel collected the samples and EEI laboratory personnel performed analysis. The December 1986 sampling confirmed the levels of chromium and cyanide contamination indicated by the Exploratory and Confirmatory Phases.

During May 1987 through November 1988, WESTON, under contract to USATHAMA, conducted Phase I of the RI program. The Phase I RI activities, which included sampling of potential source areas and more extensive groundwater sampling on and off-site, provided a better definition of the results generated by the Exploratory and Confirmatory Phases and placed an emphasis on remediation.

Phase II of the RI effort was conducted between May and August 1990 in accordance with a workplan that was formally reviewed and approved by the EPA and California regulatory agencies under the auspices of the IAG. The Phase II RI activities, which included sampling of potential source areas, more extensive groundwater sampling on- and off-site, and the installation of wells for the Interim Groundwater Treatment System (IGWTS), provided a more comprehensive contamination assessment and set up actions toward remediation of the site. A comprehensive RI report was provided to the regulatory agencies in December 1990 detailing all work completed to date.

As a result of regulatory review, additional field work was completed at the landfill, the IWTP offload area, and the sanitary sewage treatment plant sludge beds in July and August 1991. A RI Addendum was prepared and subsequently approved by the regulatory agencies in February 1992. A draft Feasibility Study Report was submitted to the regulatory agencies in March 1992 followed by a draft final on 24 September 1992. The FS recommended expansion of the IGWTS to capture and treat the groundwater contamination and proposed no action for the IWTP area and former landfill based on minimal risk to human health and the environment. On 24 October 1993, the California RWQCB invoked dispute resolution on the draft final FS report based regarding the landfill, stating that the landfill has in the past contributed to groundwater contamination and has the potential to further contaminate the groundwater. Dispute resolution was concluded in February 1993 with an agreement by the Army to install and maintain a clay cap at the site as a compromise to avoid further delays in addressing real concerns at the installation. The Proposed Plan was approved in August 1993 and was provided for public review during August through September 1993. The Record of Decision was submitted to the regulatory agencies in September 1993 and,

after lengthy negotiations over incorporation of the Dispute Resolution Agreement, the ROD was signed at a 23 March 1994 signing ceremony. RBAAP is the first federal facility to sign a site-wide ROD.

**Groundwater Interim Remedial Action:** Also, in 1989, an interim remedial action was initiated to address the groundwater contamination problem at RBAAP. A design for an interim groundwater treatment system was developed under contract by Bechtel Engineering under contract to Norris Industries.

The design was completed in December 1989, at which time a public meeting was held to discuss the interim action. Construction of the system was completed in December 1990; however, initial startup was delayed until May 1991 because of damage to the system caused by severe freezing conditions. The system was placed into 24-hour operation in September 1991 and has been treating groundwater for both cyanide and chromium at a rate of approximately 80 gallons per minute.

**Domestic Well Monitoring/Replacement Program:** In addition to the RBAAP RI activities, USATHAMA established an off-site residential well sampling program in September 1985. The residential well sampling program consists of the quarterly sampling of approximately 70 wells located west of the RBAAP boundary. Residential wells were sampled for chromium and cyanide, the contaminants of concern indicated by the site investigations. Water samples from six wells located west of the RBAAP have indicated levels of chromium in excess of 50 mg/L (drinking water standard). USATHAMA provided bottled water to those affected residents as a temporary measure until new wells could be installed. Deep wells have since been installed by USATHAMA at these residences to provide a permanent drinking water. In addition, the contaminated wells have been abandoned and sealed to insure against any further use of the contaminated groundwater.

In 1991, a removal action was initiated to provide a permanent potable water supply to the residents. An Engineering Evaluation/Cost Analysis was performed which identified extension of the Riverbank City water system as the most viable alternative. The waterline extension design was completed in April 1992, construction was initiated in May 1992 and completed in November 1992, and all potentially affected residents have been provided service. A ribbon-cutting ceremony was conducted on 4 December 1992.

**Evaporation/Percolation Ponds Removal Action:** The Phase II Survey, completed in October 1986, concluded the industrial waste ponds, located adjacent to the Stantislus River, were not a source of groundwater contamination. Approximately 3,600 yd<sup>3</sup> of sediment within the ponds were estimated to be hazardous waste according to the State of California regulations and would require removal.

A draft Engineering Evaluation/Cost Analysis (EE/CA) document for development and comparison of alternatives for remediation of E/P ponds sediments completed and submitted to the regulatory agencies in April 1990, recommending use of the zinc-contaminated sediments as a soil amendment for agricultural land. Comments were received from EPA and California Department of Health Services in June 1990.

A draft final EE/CA was submitted in November 1990 in response to regulatory comments and a revised draft was provided in March 1991, responding to requests for more detail on the soil amendments proposal. During review of the revised draft final EE/CA, it was discovered that

---

## IRP Contamination Assessment

California regulations would require classification of the zinc-contaminated sediments as hazardous wastes which would preclude their acceptance as a soil amendment.

In June 1992, the EPA conducted an EPA ecological study of the E/P ponds site which further supported a change to the proposed removal action. Also in June 1992, RWQCB insisted on additional investigation of the E/P ponds for other contaminants, even though past sampling coordinated with both California agencies screened down the contaminants of concern to zinc. This new requirement further delayed agreement on an acceptable approach.

In August 1992, the Army agreed to address RWQCB E/P ponds characterization requirements through expanded confirmatory sampling of the sediments following removal of the known zinc contamination. A revised draft final EE/CA was submitted to the EPA and California in February 1993 recommending hot spot removal of zinc-contaminated sediments for disposal at a hazardous waste landfill and expansion of the confirmatory sampling to confirm the absence of other contaminants. A public meeting was conducted on the removal action on 2 June 1993 as part of the public review period (17 May - 15 June 1993). No objections or concerns were raised during public review. An Action Memorandum was staffed to and signed by the Assistant Secretary of the Army for Environment, Safety and Occupational Health in August 1993. The removal action was conducted during September through October 1993. A final characterization report was completed in May 1994.

In 1994, the installation completed and received approval from the regulators for the first installation-wide Record of Decision. The installation also formed a technical review committee, which remains as the equivalent of the Restoration Advisory Board. In FY95, the installation completed construction of the landfill cap. In FY96, the Army constructed the off-site groundwater extraction system to minimize the migration of the plume, and to demonstrate capture of the plume. In addition, the installation began a maintenance program for the landfill cap.

In FY97, the installation completed expansion of the GWTS and began long-term monitoring (LTM). The Army submitted a petition to delete the installation from the National Priorities List (NPL). The EPA approved the preliminary closeout report and the remedial action (RA) completion Report. Riverbank became the first DoD installation on the NPL to reach the Construction Completion milestone.

In FY99, the Army added an ion exchange system to the GWTS to remove chromium and cyanide from the groundwater. This method eliminated the chemical use at the interim GWTS. In FY00, the installation closed out the RAs. Further optimization of the GWTS with innovative technologies eliminated 50 percent of the operating cost, or \$600,000. The installation also developed and implemented a computer-based system to transfer all documents to a compact disc. In FY01, the installation continued with Optimization efforts by receiving permission to use the City of Riverbank's publicly owned treatment works for discharge of the treated water. The installation also further reduced the operating expense for the treatment cost as planned. The installation explored awarding a contract for a Fluidized Bed Treatment system for reduction and or elimination of Nitrates. This will further reduce the cost and dependence on the City's POTW.

In FY02, the installation successfully completed the installation of a Fluidized Bed Reactor for the treatment of elevated levels of Nitrates. This system successfully reduced the Nitrate level from approximately 40 mg/l to less than 20 mg/l. This system was necessary due to the cancellation by the City of Riverbank to further handle the discharge of the GWTP. In FY02 the installation negotiated with the State of California to raise the Nitrate discharge level, which allows for

---

## IRP Contamination Assessment

discharge of the treated groundwater without further treatment. As a result of this temporary increase in the Nitrate levels, further treatment with the FBR is no longer required. It is important to note that permanent approval for the raised Nitrate levels is dependent on completion of the E/P Ponds groundwater study, which was due to be completed in FY03. In addition, in FY02, the installation implemented a Treatability Study for Chromium. This study utilizes In Situ chemical reduction at the highest source areas of Chromium. Initial laboratory studies have been completed which reflect positive conclusions for the support of this process. Final implementation of this system is dependent on receiving a groundwater discharge permit from the State of California.

### ***CLEANUP EXIT STRATEGY:***

The exit strategy for RBAAP will be detailed in the final ramp-down/exit strategy plan and final NPL de-listing plan. As previously stated, plans detailing ramp-down and exit strategy and NPL de-listing are under Army review.



## PREVIOUS STUDIES

### 1987

- Final Report - Remedial Investigation of the Riverbank Army Ammunition Plant, Envirodyne Engineers, Inc., April-87

### 1989

- Riverbank Army Ammunition Plant - Remedial Investigation/Feasibility Study Groundwater Model Calibration Report, Roy F. Weston, Inc., March-89
- Air Force Plant 44 Pilot Ground-Water Treatment Plant - Equipment Assessment Report, Bechtel Environmental, Inc., September-89
- Riverbank AAP - Investigation and Evaluation of Underground Storage Tanks , U.S. Army Engineer District - Omaha, September-89
- Engineering Evaluation/Cost Assessment Report for the Interim Ground-Water Treatment System Removal Action Selection at the Riverbank Army Ammunition Plant, Bechtel Environmental, Inc., November-89
- Ground-Water Extraction and Treatment System 100 Percent IRM Design - Riverbank Army Ammunition Plant, Bechtel Environmental, Inc., December-89

### 1990

- Installation Assessment of Riverbank Army Ammunition Plant, Report No. 144, U.S. Army Toxic and Hazardous Materials Agency, January-90
- Installation Assessment of Riverbank Army Ammunition Plant, U.S. Army Toxic and Hazardous Materials Agency, January-90
- Interim Remedial Measure Plan at the Riverbank Army Ammunition Plant, Bechtel Environmental, Inc., April-90

### 1991

- Water Quality Consultation No. 31-66-GE71-92 - Riverbank Army Ammunition Plant, U.S. Army Environmental Hygiene Agency, March-91
- Wastewater Management Survey No. 32-66-0144-91 - Riverbank Army Ammunition Plant, U.S. Army Environmental Hygiene Agency, June-91

### 1992

- Remedial Investigation (RI) Report - Riverbank Army Ammunition Plant, Roy F. Weston, Inc., February-92

### 1993

- Riverbank Army Ammunition Plant (RBAAP) Engineering Evaluation/Cost Analysis (EE/CA) for the Evaporation/Percolation (E/P) Ponds, Roy F. Weston, Inc., February-93
- Feasibility Study (FS) Report, Roy F. Weston, Inc., June-93
- Riverbank Army Ammunition Plant (RBAAP) Proposed Plan, USAEC, August-93

### 1994

- Record of Decision, Riverbank Army Ammunition Plant, USAEC, March-94
- Evaporation/Percolation (E/P) Ponds Characterization Report, Roy F. Weston, Inc., May-94
- Riverbank Army Ammunition Plant Conceptual Design Report, Roy F. Weston, Inc., June-94
- Riverbank Army Ammunition Plant Remedial Design of Landfill Closure Work Plan, CH2MHill, June-94
- Riverbank Army Ammunition Plant Remedial Design of Groundwater Extraction and Treatment System Work Plan, CH2MHill, June-94
- Riverbank Army Ammunition Plant Landfill Closure 100 Percent Design Document, CH2MHill, December-94

## **PREVIOUS STUDIES**

**1995**

- Riverbank Army Ammunition Plant Groundwater Extraction and Treatment System 100 Percent Design Document, CH2MHill, August-95

# RIVERBANK ARMY AMMUNITION PLANT

## INSTALLATION RESTORATION PROGRAM

### SITE DESCRIPTIONS

# LANDFILL, RBAAP

## RBAAP-01

### SITE DESCRIPTION

RBAAP-01 is located in the northern section of the main plant near the eastern boundary. The site is approximately 4.5 acres in size and was the site of surface and trench disposal and burning from 1942 to 1966. All surface debris was removed in 1987.

Wells placed down-gradient of the landfill have indicated that the landfill was a possible source of cyanide and chromium contamination in groundwater. Cyanide contamination has been linked to pot liner from aluminum reduction processes, a RCRA listed waste, and has been found in the southern portion of the landfill. Most of the pot liner was removed during previous rubble removal efforts. Chromium contamination has been traced to construction rubble which contained chromium contaminated bricks. These were also removed from the site during a 1987 rubble cleanup effort. Although the landfill was a source of groundwater contamination, the source has been depleted and it no longer poses a threat to groundwater quality. As a compromise during dispute resolution over the draft final FS report, the Army agreed to install and maintain a clay cap at the landfill. The final site-wide ROD documents this remedial action selection.

### CLEANUP STRATEGY

Long Term Monitoring will continue. The completed Landfill Cap will be maintained. Annual surveys to assure stability and annual management of a pesticide program to prevent damage to the completed Landfill Cap are planned.

### STATUS

**RRSE:** High

**CONTAMINANTS:** Cyanide,  
Hexavalent Chromium

**MEDIA OF CONCERN:** Soil,  
Groundwater

PHASES	Start	End
PA .....	197910 .....	198009
SI.....	198010 .....	198509
RI/FS .....	198510 .....	199306
RD.....	198709 .....	199502
IRA .....	198910 .....	199009
RA(C) .....	199506 .....	199509
RA(O) .....	199509 .....	200109
LTM.....	200203 .....	201509

**RC: 199509**

# WASTE SALT DISPOSAL PIT

## RBAAP-02

### SITE DESCRIPTION

RBAAP-02 is located adjacent to the former landfill to the west. The waste salt pond was constructed for use as an evaporation basin for wash water from the nitrate molten salt annealing process. Completed in 1969, it was never used for this purpose, since anticipated orders were never received. The Installation Assessment incorrectly stated that the pond was used to desiccate sludge from the IWTP in 1975 and that the sludge was eventually removed and taken to a sanitary landfill. According to plant officials the waste salt pond was not used for any disposal operations. Sampling of the pond was not conducted based on this information. The Feasibility Study recommended no further action for this site, as is documented in the final site-wide ROD.

This site is Response Complete under the IRP.

### STATUS

**RRSE:** Not Evaluated

**CONTAMINANTS:** None

**MEDIA OF CONCERN:**  
None

<b>PHASES</b>	<b>Start</b>	<b>End</b>
PA .....	197910 .....	198009
SI.....	198010 .....	198509
RI/FS.....	198510 .....	199210

**RC: 199306**

# GROUND WATER TRMT PLNT (GWTP)

## RBAAP-03

### SITE DESCRIPTION

RBAAP-03 is located in the central part of the main plant area. The IWTP at RBAAP was constructed to treat the wastewaters generated from the electroplating, cleaning and metal finishing processes that are operated on-site. The IWTP includes facilities for flocculation, clarification, sludge thickening, sludge/liquid separation, and nitrate salt removal. The original storage and equalization tanks used for the IWTP were made of redwood. During periods of low flow to the IWTP the redwood would desiccate, causing gaps between the timbers. Upon filling, fluid would leak through the gaps to the ground until the timbers swelled once again and closed the gaps. From 1973 to 1980 the IWTP was upgraded and the redwood tanks were replaced with concrete tanks. Based on groundwater contamination in the area, the IWTP area has been identified as a major source of chromium contamination in the groundwater. The final site-wide ROD required expansion of the groundwater treatment system to fully capture groundwater contamination. This system is now removing the contaminated groundwater by means of Ion Exchange.

### CLEANUP STRATEGY

Long Term Monitoring and Operations of the Groundwater Treatment System will continue. The Pilot Study for Treatability for Chromium will continue until completion. A Treatability Study for Cyanide will be implemented. Management of the electronically produced analytical results will continue. A Cost-Effective Sampling Program for groundwater monitoring will be conducted.

### STATUS

**RRSE:** High

**CONTAMINANTS:** Hexavalent Chromium

**MEDIA OF CONCERN:**  
Soil, Groundwater

PHASES	Start	End
PA .....	197910 .....	198009
SI.....	198010 .....	198509
RI/FS.....	198510 .....	199306
RD .....	198709 .....	199504
IRA.....	198910 .....	199012
RA(C).....	199609 .....	199809
<b>RA(O) .....</b>	<b>199609 .....</b>	<b>200809</b>
LTM.....	200810 .....	202309

**RC: 200809**

# IWTP EFFLUENT SEWER LINE BREAK

## RBAAP-04

### SITE DESCRIPTION

In 1972, a major leak was detected in the IWTP effluent pipe, which carries treated wastewater to the E/P ponds, at the location of the pipe intersection with the Hetch-Hetchy Aqueduct. The leak was not discovered for 7 days, during which time approximately 1 million gallons per day of wastewater was being discharged through the pipe. The sewer line at the leak was a force drain, and the force of the liquid caused erosion around the pipe, resulting in wastewater pooling at the ground surface. An unknown amount of treated wastewater leaked from the pipe. During the Confirmatory Phase of the Contamination Survey, an investigation was conducted in the vicinity of the pipe leak. Four investigative borings and one background boring were completed and samples were analyzed for California Title 22 metals. Only concentrations of total chromium, copper, and fluorine were found to be close to or more than three times the background sample values. Therefore, the soil in the vicinity of the IWTP line break is not considered to be contaminated. The Feasibility Study recommended no further action for this site, as is documented in the final site-wide ROD.

This site is Response Complete under the IRP.

### STATUS

**RRSE:** Not Evaluated

**CONTAMINANTS:** None

**MEDIA OF CONCERN:** None

<b>PHASES</b>	<b>Start</b>	<b>End</b>
PA .....	197910 .....	198009
SI .....	198010 .....	198509
RI/FS .....	198510 .....	199210

**RC: 199306**

# BLDG. 13, CHROMIUM TRMT

## RBAAP-05

### SITE DESCRIPTION

RBAAP-05 is located in the southern end of Building 13 on the southwestern part of the main plant area. The chromium pretreatment system was installed in 1978 as part of the upgrades to the IWTP to pretreat the waste stream from the zinc chromate dip solution used on the production lines prior to discharge to the IWTP. The treatment system reduced the chromium from a hexavalent state to a trivalent state, which could then be precipitated prior to discharge of the waste stream to the IWTP. No direct sampling was conducted around this system because it is an operating facility. However, the groundwater investigation concluded that the major source of chromium contamination was the leaking tanks of the IWTP prior to the system upgrade. The Feasibility Study recommended no further action for this site, as is documented in the final site-wide ROD.

This site is Response Complete under the IRP.

### STATUS

**RRSE:** Not Evaluated

**CONTAMINANTS:** None

**MEDIA OF CONCERN:** None

<b>PHASES</b>	<b>Start</b>	<b>End</b>
PA .....	197910 .....	198009
SI .....	198010 .....	198509
RI/FS .....	198510 .....	199210

**RC: 199306**

## IWTP H2SO4 SPILL RBAAP-06

### SITE DESCRIPTION

RBAAP-06 is located within the IWTP area and is the site of a sulfuric acid spill in 1956. The site was reported to be within the IWTP area, which was the focus of the RI program. The IWTP area was found to be clear of contamination at levels, which would adversely impact human health or the environment, including groundwater. The Feasibility Study recommended no further action for this site, as is documented in the final site-wide ROD.

This site is Response Complete under the IRP.

### STATUS

**RRSE:** Not Evaluated

**CONTAMINANTS:** None

**MEDIA OF CONCERN:** None

<u>PHASES</u>	<u>Start</u>	<u>End</u>
PA .....	197910 .....	198009
SI.....	198010 .....	198509
RI/FS.....	198510 .....	199210

**RC: 199306**

## BLDG. 13 PHOS SPILL RBAAP-07

### SITE DESCRIPTION

RBAAP-07 was the site of a phosphoric acid spill in 1978 and is located near the chromium pretreatment system. Through the groundwater investigations the contaminants of concern at RBAAP were narrowed down to chromium and cyanide. Neither of these contaminants were linked to the phosphoric acid spill. The Feasibility Study recommended no further action for this site, as is documented in the final site-wide ROD.

This site is Response Complete under the IRP.

### STATUS

**RRSE:** Not Evaluated

**CONTAMINANTS:** None

**MEDIA OF CONCERN:** None

<u>PHASES</u>	<u>Start</u>	<u>End</u>
PA .....	197910 .....	198009
SI.....	198010 .....	198509
RI/FS.....	198510 .....	199210

**RC: 199306**



## SE STORM RESERVOIR RBAAP-08

### SITE DESCRIPTION

RBAAP-08 is located in the southeastern part of the main plant area near the eastern boundary. The southeast storm reservoir collects stormwater from the southeast portion of the site, and during times of heavy rainfall, the water from this reservoir is pumped to the northwest storm reservoir. Based on the reported presence of heavy metals in a water sample from the northwest storm reservoir (AEHA, 1974), an investigation of the southeast reservoir was conducted during the Phase I RI efforts. One sediment sample was collected and analyzed for total and hexavalent chromium, total and free cyanide, 1,1-dichloroethylene, and the organic persistent and bioaccumulative toxic substances listed in California Title 22 Codes. Analysis showed the reservoir indicated no contamination above background levels. The Feasibility Study recommended no further action for this site, as is documented in the final site-wide ROD.

This site is Response Complete under the IRP.

### STATUS

**RRSE:** Not Evaluated

**CONTAMINANTS:** None

**MEDIA OF CONCERN:** None

<b>PHASES</b>	<b>Start</b>	<b>End</b>
PA .....	197910 .....	198009
SI .....	198010 .....	198509
RI/FS .....	198510 .....	199306

**RC: 199306**

## NW STORM RESERVOIR RBAAP-09

### SITE DESCRIPTION

RBAAP-09 is located in the northwest section of the main plant area just south of the grazing area. The northwest storm reservoir collects stormwater from the majority of the main plant area and is the discharge point for excess runoff from the southeast storm reservoir. Overflow from the northwest reservoir discharges to the Oakdale Irrigation Canal. The Installation Assessment (IA) referenced a 1974 AEHA report regarding industrial wastewater of RBAAP. As noted in the IA, one segment of the AEHA study examined the chemical analysis of a water sample from the northwest stormwater reservoir. The results indicated elevated levels of some heavy metals that were then cited as a possible source of contamination at RBAAP. Sampling efforts were conducted during Phase I of the RI to verify the presence of sediment contamination in the reservoir and to determine the potential for contaminant migration. Two sediment samples were taken from the reservoir and analyzed for total and hexavalent chromium, total and free cyanide, 1,1-dichloroethylene, and the organic persistent and bioaccumulative toxic substances listed in California Title 22 Codes. Analysis showed the reservoir contained total chromium at levels greater than 3 times background levels; however, the reservoir is not considered a source of groundwater contamination based on California's Designated Level Methodology (DLM) which models the potential impact of contaminated soils on groundwater. The Feasibility Study recommended no further action for this site, as is documented in the final site-wide ROD.

### STATUS

**RRSE:** Not Evaluated

**CONTAMINANTS:** None

**MEDIA OF CONCERN:** None

<b>PHASES</b>	<b>Start</b>	<b>End</b>
PA .....	197910.....	198009
SI .....	198010.....	198509
RI/FS .....	198510.....	199306

**RC: 199306**

## SEWAGE TRMT PLNT / SLUDGE BEDS

### RBAAP-10

#### SITE DESCRIPTION

RBAAP-10 is located west of the northern portion of the former landfill area. The sewage treatment plant consisted of a sewage pump station discharging into an Imhoff tank for treatment of the wastewater. Sludge was periodically drawn from the digestion chamber for drying in the sludge beds. Operation of the system was discontinued when the plant tied into the Riverbank sanitary sewer system in 1987. Sampling was conducted at the sewage beds in August 1991 under the RI addendum effort in order to meet requirements for addressing solid waste management units on the installation. The sampling effort concluded that the sludge beds did not contain chromium or cyanide above background levels. The Feasibility Study recommended no further action for this site, as is documented in the final site-wide ROD.

This site is Response Complete under the IRP.

#### STATUS

**RRSE:** Not Evaluated

**CONTAMINANTS:** None

**MEDIA OF CONCERN:** None

PHASES	Start	End
PA .....	197910 .....	198009
SI .....	198010 .....	198509
RI/FS .....	198310 .....	199306

**RC: 199306**

## PERC / EVAP PONDS (STANTISLAUS)

### RBAAP-11

#### SITE DESCRIPTION

RBAAP-11 occupies 27 acres on the banks of the Stantislau River approximately 1.5 miles north of the main plant area. The E/P Ponds were constructed in 1952 for the disposal of treated effluent generated at RBAAP. The four ponds are separated by a series of berms, which were raised in 1972 to increase capacity. Also berms were installed within each pond to act as baffles to eliminate erosion. The effluent flow is discharged into the first pond and overflow is sent to the second and so forth. The effluent discharged to the ponds evaporates and/or percolates through the existing sediments to the groundwater, thereby precipitating sediments into the bottom of the ponds. The final sediment characterization report, completed in May 1994 following the removal action, concluded that no further action is warranted at the E/P Ponds. The final site-wide ROD documents this recommendation.

This site is Response Complete under the IRP.

#### STATUS

**RRSE:** Not Evaluated

**CONTAMINANTS:** Zinc

**MEDIA OF CONCERN:** Soil,  
Groundwater

PHASES	Start	End
PA .....	197910.....	198009
SI .....	198010.....	198509
RI/FS .....	198510.....	199310
RD .....	199311.....	199311
RA(C).....	199309.....	199312

**RC: 199312**

## PAST MILESTONES

IRP PA Initiation	Jan 80
PA/SI, Installation	Sep 85
Interim GWTS Design (RBAAP-01 and 03)	Dec 89
Interim GWTS On-line (RBAAP-01 and 03)	May 91
RI (All sites)	Feb 92
Waterline Design (RBAAP-01 and 03)	Mar 92
Waterline On-line (RBAAP-01 and 03)	Dec 92
FS (All sites)	Jun 93
EE/CA (RBAAP-11)	Jun 93
Action Memorandum (RBAAP-11)	Aug 93
Removal Action (RBAAP-11)	Oct 93
Proposed Plan (Site-wide)	Sep 93
ROD (Site-wide)	Mar 94
Remedial Design (Landfill)	Dec 94
Remedial Design (GWTS)	Aug 95
Remedial Action (Landfill)	Oct 95
NPL Delisting Petition	Sep 96
Remedial Action (GWTS)	Sep 96
Construction Completion (Site-wide)	Sep 97

## PROJECTED MILESTONES

### *Phase Completion Milestones:*

*Projected completion date of all RA:* 1998

*Projected completion date of IRP:* 2023

*Completion Date of all RA(C) Activities:* 1998

*Completion Date of IRP (including LTM phase):* 2023

# Riverbank Army Ammo Plant IRP Schedule

(Based on current funding constraints)

## CURRENT PHASE

## FUTURE PHASE

AEDB-R #	SITE TITLE	PHASE	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15
PBC	PBC at Riverbank	RA(O)										
RBAAP-01	Landfill, RBAAP	LTM										
RBAAP-03	Ground Water Trmt Plnt (GWTP)	RA(O)										
		LTM										

**PRIOR YEAR FUNDING**

Past and present funding for Installation Restoration Program activities has been broken down by fiscal year.

<b>Year</b>	<b>Site Information</b>	<b>Expenditures</b>	<b>FY Total</b>
<b>FY80</b>	Recorded Search	\$50,000	<b>\$50,000</b>
<b>FY84</b>	Contamination Survey (Phase I)	\$261,000	<b>\$261,000</b>
<b>FY85</b>	Modification to Phase I Survey	\$14,300	<b>\$14,300</b>
<b>FY86</b>	Contamination Survey	\$603,500	<b>\$777,600</b>
	Groundwater Model Development	\$144,100	
	Replacement of Domestic Wells	\$30,000	
<b>FY87</b>	Comprehensive RI/FS	\$1,587,500	<b>\$2,390,600</b>
	Removal of Landfill Rubble	\$329,200	
	IRM Design	\$189,300	
	Quarterly Off-post Monitoring	\$204,400	
	Groundwater Modeling Support	\$40,000	
	Monthly Water Level Measurement	\$20,000	
	Modification to FY86 Program (Model)	\$19,800	
	Off-post Leases	\$400	
<b>FY88</b>	Modification to FY87 Program (Landfill Rubble)	\$145,900	<b>\$278,700</b>
	Continuation of Off-post Monitoring Program	\$118,000	
	Replacement of Domestic Wells	\$9,200	
	Assistance for Claim Settlement	\$3,500	
	Off-post Well Leases	\$2,100	
<b>FY89</b>	Landscaping/Repair of Personal Property	\$2,300	<b>\$1,948,300</b>
	Off-post Groundwater Sampling	\$99,100	
	Completion of Ongoing RI/FS	\$1,175,100	
	Mod to Design of IGWTS	\$123,000	
	RA (New Brighton WTP)	\$126,000	
	Transfer of Pilot GWTP from USAF to RBAAP	\$211,500	
	Treatability Study (E/P Pond Measurements)	\$12,100	
	Monthly Water Level Measurements	\$22,400	
	PAO Support	\$20,000	
	E/P Ponds	\$9,900	
	Property Leases	\$2,100	
	Modifications to FY87 Comp. RI/FS	\$34,800	
	UST Removal	\$110,000	

Year	Site Information	Expenditures	FY Total
<b>FY90</b>	E/P Ponds Sediment Removal	\$894,800	
	RI Follow-up	\$161,600	
	Interim Groundwater Treatment System (Design)	\$52,200	
	Interim Groundwater Treatment System (Install)	\$1,311,200	
	Off-Post Sampling Program	\$90,500	
	FY90 Off-Post Property Leases	\$2,000	
	Public Affairs (RBAAP Support)	\$31,400	<b>\$2,543,700</b>
<b>FY91</b>	E/P Ponds Technical Support	\$10,000	
	Pre-ROD RI/FS Follow-up	\$805,300	
	Interim GW Treatment System (Installation S&A)	\$32,700	
	Interim GW Treatment System (Operations)	\$241,100	
	Waterline Extension (S&A)	\$79,000	
	Waterline Extension (RD/RA)	\$977,500	
	Monitoring (IGWTS/Off-post Sampling)	\$353,700	
	FY91 Off-Post Property Leases	\$2,600	
	E/P Ponds (RA)	\$230,000	<b>\$2,731,900</b>
<b>FY92</b>	SWMU RFI (RBAP91S007)	\$505,900	
	IGWTS (Installation S&A) (RBAP91S015)	\$39,900	
	IGWTS (Operations) (RBAP89F021)	\$565,000	
	Monitoring (IGWTS/Off-post Sampling) (RBAP89F010)	\$358,400	
	UST Removal	\$40,000	
	FY92 Off-Post Property Leases (RBAP91S017)	\$2,700	<b>\$1,511,900</b>
	<b>Supplemental</b>		
	E/P Ponds Removal Action (RBAP89F023)	\$709,900	
	IGWTS (Installation S&A) (RBAP91S015)	\$4,500	
	IGWTS (Operations) (RBAP89F021)	\$821,400	<b>\$1,535,800</b>
<b>FY93</b>	Groundwater Monitoring (RBAP89F010)	\$109,000	
	SWMU RFI (RBAP91S007)	\$608,900	
	FY93 Off-Post Property Leases (RBAP91S017)	\$2,900	
	IGWTS (Operations) (RBAP89F021)	\$91,000	
	IGWTS (Installation S&A) (RBAP91S015)	\$43,000	
	Remedial Design (RBAP91S005)	\$61,000	
	Waterline S&A (RBAP91S004)	\$31,300	
	UST Removal (RBAP89F012)	\$14,900	
	Shared DERA Costs (RBAP93-007)	\$350,000	<b>\$1,312,000</b>
<b>FY94</b>	Groundwater Monitoring (RBAP89F010)	\$185,700	
	FY94 Off-Post Property Leases (RBAP91S017)	\$10,000	
	IGWTS (Operations) (RBAP89F021)	\$1,825,300	
	IGWTS (Pilot Study) (RBAP92-007)	\$80,000	
	Remedial Design (RBAP91S005)	\$500,000	
	UST Removal (RBAP89F012)	\$400,000	
	Shared DERA Costs (RBAP93-007)	\$348,000	<b>\$3,349,000</b>

Year	Site Information	Expenditures	FY Total
<b>FY95</b>	Groundwater Monitoring (RBAP89F010)	\$355,000	
	IGWTS (Operations) (RBAP89F021)	\$2,828,900	
	Remedial Design (RBAP91S005)	\$308,800	
	Remedial Action (RBAP91S006)	\$5,677,000	<b>\$9,169,700</b>
<b>FY96</b>	Groundwater Monitoring (RBAP89F010)	\$550,500	
	IGWTS (Operations) (RBAP89F021)	\$2,495,600	
	System Evaluation (RBAP96-008)	\$1,050,000	
	FY95 Off-Post Property Leases (RBAP91S017)	\$200,000	
	Remedial Action S&A (RBAP-92-036)	\$1,740,000	<b>\$6,036,100</b>
<b>FY97</b>	Groundwater Monitoring (RBAP89F010)	\$500,000	
	IGWTS (Operations) (RBAP89F021)	\$1,879,600	
	System Evaluation (RBAP96-008)	\$100,000	
	Leases (RBAP91S017)	\$20,000	
	Remedial Action S&A (RBAP-92-036)	\$50,000	
	Landfill Maintenance (RBAP95-005)	\$20,000	<b>\$2,569,600</b>
<b>FY98</b>	Groundwater Monitoring (RBAP89F010)	\$500,000	
	Leases (RBAP91S017)	\$20,000	
	IGWTS (Operations) (RBAP89F021)	\$1,879,600	
	RA S&A	\$50,000	
	System Evaluations	\$100,000	
	Landfill Maintenance	\$20,000	<b>\$2,569,600</b>
<b>FY99</b>	Groundwater Monitoring (RBAP89F010)	\$155,600	
	Leases (RBAP91S017)	\$20,000	
	IGWTS (Operations) (RBAP89F021)	\$1,879,600	
	RA S&A	\$50,000	
	System Evaluations	\$94,300	
	Landfill Maintenance	\$20,000	<b>\$2,219,500</b>
<b>FY00</b>	Groundwater Monitoring (RBAP89F010)	\$155,600	
	Leases (RBAP91S017)	\$12,000	
	GWTS (Operations) (RBAP89F021)	\$809,141	
	Landfill Maintenance	\$39,000	<b>\$1,015,741</b>
<b>FY01</b>	Groundwater Monitoring (RBAP89F010)	\$143,726	
	Leases (RBAP91S017)	\$29,240	
	GWTS (Operations) (RBAP89F021)	\$930,000	
	Landfill Maintenance	\$14,000	<b>\$1,116,966</b>
<b>FY02</b>	Groundwater Monitoring (RBAP89F010)	\$140,000	
	Leases (RBAP91S017)	\$32,000	
	LLNL	\$350,000	
	GWTS (Operations) (RBAP89F021)	\$1,100,500	
	Landfill Maintenance	\$14,000	<b>\$1,636,500</b>

Year	Site Information	Expenditures	FY Total
<b>FY03</b>	RBAAP-01 LTM	\$34,000	
	RBAAP-03 RA(O)	\$1,334,000	<b>\$1,368,000</b>
<b>FY04</b>	PBC at Riverbank RA(O)	\$2,726,000	
	RBAAP-003 RA(O)	\$714,000	<b>\$3,440,000</b>
<b>TOTAL FUNDING 1980-2004:</b>		<b>\$50,749,787</b>	

## CURRENT YEAR FUNDING

Year	Site Information	Expenditures	FY Total
<b>FY05</b>	RBAAP-03 RAO	\$658,500	
	RBAAP-PBC RAO	\$247,000	<b>\$905,500</b>

## FUTURE YEAR FUNDING

***TOTAL FUTURE REQUIREMENTS:***      \$ 3,145,000

***TOTAL IRP PROGRAM COSTS:***      \$53,894,787



---

## Community Involvement

A strong relationship between RBAAP and the community began in 1985 with the establishment of the TRC, the precursor to today's RABs. In 1943, DoD established RABs to increase public participation. RBAAP solicited community interest in forming a RAB, but since the cleanup process was already well underway, the ROD was already signed, and the community had been well informed throughout the process, little interest was expressed in establishing a RAB. Since the community was not in favor of establishing a formal RAB, RBAAP requested exemption to the DoD RAB policy to keep the TRC intact.

RIVERBANK ARMY  
AMMUNITION PLANT  
MILITARY MUNITIONS RESPONSE  
PROGRAM

---

## MMRP Summary

**STATUS:** Non-NPL

**AEDB-R SITES/SITES RC:** 1/0

**AEDB-R SITE TYPES:**

1 Pistol Range

**CONTAMINANTS OF CONCERN:** Metals, UXO

**MEDIA OF CONCERN:** Soil

**TOTAL ER,A FUNDING:**

PRIOR YEAR:	\$ 25,000
CURRENT	\$ 0
FUTURE	\$1,243,000

**DURATION OF IRP:**

YEAR OF MMRP INCEPTION:	2002
YEAR OF RA COMPLETION:	2015+
YEAR OF MMRP COMPLETION:	2015+

---

## MMRP Contamination Assessment

The range is part of an area that is currently undeveloped and is used for cattle grazing. It is not known when the range was constructed, or when it ceased operating. It is assumed that the range operated between 1942, when the installation opened, and the mid 1960's. This range is depicted on an historical map from 1956; however, more recent maps show no indication of the range. Additionally, an interviewee stated that the range was not used during his tenure, which began in 1967. It was mentioned by another interviewee that the levies surrounding the reservoir, which included the backstop for this range, were torn down in 1980, due to their poor condition, and reconstructed. There have been no known response actions at this range.

### ***CLEANUP EXIT STRATEGY:***

The Army has completed a "Closed, Transferring and Transferred Range/Site inventory Report", March 2003. Pursuant to the "CTT Range and Site Summaries" on page D-2 of the aforementioned document, the backstop for the pistol range was incorporated into the levee of a reservoir. Additionally, the reservoir levees were removed and reconstructed in 1980 because of their poor condition. The conclusions of the CTT/Site Inventory Report were that the pistol range had not been in operation from 1967 to the present and the Risk Assessment Code (RAC) for the pistol range was 5: Negligible Explosives Safety Risk – No explosive related action necessary. Pursuant to the MMRP CTC spreadsheet, a Preliminary Assessment/Site Inspection (PA/SI) is scheduled for FY08. Based on the results of the CTT/Site Inventory Report, a No Further Action decision is probable upon completion of the PA/SI.

# RIVERBANK ARMY AMMUNITION PLANT

## MILITARY MUNITIONS RESPONSE PROGRAM

### SITE DESCRIPTIONS

RBAAP-001-R-01  
PISTOL RANGE

SITE DESCRIPTION

This is a closed pistol range, still owned by the U.S. Army, comprising 29 acres in the northwestern portion of the main installation property, and oriented towards the northeast. Small arms munitions were expended on this range. The range is part of an area that is currently undeveloped and is used for cattle grazing. It is not known when the range was constructed, or when it ceased operating. It is assumed that the range operated between 1942, when the installation opened, and the mid 1960’s. This range is depicted on an historical map from 1956; however, more recent maps show no indication of the range. Additionally, an interviewee stated that the range was not used during his tenure, which began in 1967. It was mentioned by another interviewee that the levies surrounding the reservoir, which included the backstop for this range, were torn down in 1980, due to their poor condition, and reconstructed. There have been no known response actions at this range.

CLEANUP STRATEGY

Additional investigation is planned. Soil removal may be needed.

STATUS

RAC Score: NR  
CONTAMINANTS: Lead  
MEDIA OF CONCERN: Soil

PHASES	Start	End
PA .....	200210.....	200305
SI .....	200710.....	200809
RI/FS .....	201410.....	201509
RD .....	201510.....	201609
RA(C).....	201610.....	201709

RC: 201709

## PAST MILESTONES

MMRP Start Date: 2002

## PROJECTED MILESTONES

### *Phase Completion Milestones:*

Site Inspection: 2008

Remedial Investigation/Feasibility Study: 2015

Remedial Design: 2016

Remedial Action Complete: 2017

# Riverbank Army Ammo Plant MMRP Schedule

(Based on current funding constraints)

## CURRENT PHASE

## FUTURE PHASE

AEDB-R #	SITE TITLE	PHASE	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15
RBAAP-001-R-01	PISTOL RANGE	SI										
		RI/FS										
		RD										
		RA (C)										



**PRIOR YEAR FUNDING**

**TOTAL:**     \$ 25,000

**CURRENT YEAR FUNDING**

**FY05:**         \$ 0

**FUTURE YEAR FUNDING**

***TOTAL FUTURE REQUIREMENTS:***     \$1,243,000

***TOTAL IRP PROGRAM COSTS:***         \$1,268,000